MAKING IT ALL HAPPEN: THE COMBINED TEST TEAM CONCEPT

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Introduction

The U.S. Army aviation community's mission is to ensure that the most technologically advanced equipment is available for use by the U.S. Armed Forces. The U.S. Army Aviation Technical Test Center (ATTC) at Fort Rucker, AL, focuses its test and evaluation (T&E) mission on planning, conducting, analyzing, and reporting on airworthiness qualification and developmental tests of most aviation equipment (e.g., aircraft, aviation systems and subsystems, and related equipment). The purpose of this T&E effort is to ensure that all equipment used in the field is safe and of the highest quality for the men and women who use it.

Various DOD organizations test equipment to determine whether the manufacturers' operational limits are accurate and whether established requirements are realistic and achievable. These DOD organizations conduct performance, compatibility, and effectiveness tests on equipment, asking questions such as "Do all parts taken together work as a whole?" Alterations and additions to the equipment are monitored and tracked throughout their life cycle.

As one of six test centers assigned to the U.S. Army Developmental Test Command at Aberdeen Proving Ground, MD, ATTC performs aircraft-related testing that includes initial envelope expansion and hardware and software changes. ATTC also monitors contractor and government qualifications.

To increase efficiency, ATTC has begun implementing the Combined Test Team (CTT) concept. The CTT concept consolidates all contractor, subcontractor, and government development and test personnel (and assets) to monitor all test and data requirements associated with fielding weapon systems. For aircraft-related testing, this includes all initial envelope expansion, hardware and software changes, and both contractor and government qualifications. DoD Regulation 5000.2-R states that integrated product teams be used to the fullest extent possible for product acquisition to allow for early identification and resolution of problems when the cost to implement changes are low and to decrease overall program risks.

CTTs are designed to eliminate redundant government and contractor testing, thereby mandating that traditional independent verification and validation be abandoned in favor of a joint approach. CTTs also allow early government systems evaluation, resulting in earlier feedback to the contractor and sponsor. Finally, CTTs establish a government capability for organic support (i.e., establish expertise and methods for testing from within as opposed to testing from the outside). "Piggybacking" off other organizations greatly reduces the duplication of flight test efforts. As long as the data are accurate, independent reporting can still be accomplished because these data can be used universally for identical conditions.

The CTT concept will produce a thoroughly researched product well within the budget constraints of the past 10 years. It is essential to reduce costs and yet still provide the finest equipment. By conserving resources, the Army aviation community has succeeded. The following example illustrates the effectiveness of the CTT approach.

Wide Chord Blade

The wide chord blade (WCB) (accompanying photo) was designed to increase the hover payload, level flight, and maneuvering performance of the UH-60 family of helicopters, especially at high gross weight and high-density altitudes. The WCB was also designed for use on the S-92 currently undergoing flight testing for civilian certification. From November 1993 to October 1995, Sikorsky Aircraft Corp. conducted initial developmental flight testing of the WCB under Sikorsky independent research and development funding. Six configurations of the WCB were flown on a single UH-60A/L test aircraft, and two

UH-60 wide cord blade modification

configurations were flown on production UH-60L aircraft. The production WCB is made from the same mold as the S-92 rotor blade and incorporates a wider chord; advanced airfoils; and a swept, tapered, anhedral blade tip.

In September 1998, the Defense Advanced Research Projects Agency, under the DOD Commercial Operations and Support Savings initiative, funded the Dual-Use Application Program (DUAP) for the WCB to reduce the time and cost associated with qualifying commercial off-the-shelf equipment for use on military hardware. The DUAP resulted in a 2-year agreement between Sikorsky and the U.S. Army to share costs associated with qualifying the WCB. A natural extension of the cooperative aspects of this agreement involved implementing an integrated process team (IPT) to develop an airworthiness qualification specification (AQS) and a combined test team for executing the flight test program.

In April 1999, the Program Manager's Office, Utility Helicopter (PMO-UH) formed an IPT to develop an AQS for the wide chord blade. The IPT included personnel from ATTC, the U.S. Army Aviation and Missile Command (AMCOM) Aviation Engineering Directorate, and Sikorsky. The government and Sikorsky approved the AQS in May 1999. As part of the AQS, the IPT recommended that the government and Sikorsky form a CTT to flight test the wide chord blade. The wide chord blade combined test team consisted of personnel from the AMCOM Aviation Engineering Directorate, flight test personnel from ATTC and Sikorsky, and management personnel from PMO-UH. The CTT was responsible for developing and executing a flight test plan for the qualification of the WCB installed on UH-60L and MH-60K helicopters. All recommendations made by the WCB CTT required approval by the Sikorsky Quality Assurance Board (QAB). This board included senior Sikorsky engineers and managers as well as a government representative from the AMCOM Aviation Engineering Directorate. The CTT finalized the flight test plan in January 1999, and the QAB approved the flight test in March 1999. The first flight of the WCB occurred March 25, 1999. Flight testing of the WCB on the UH-60L was completed in the third quarter of FY99 and on the MH-60K during the fourth quarter of FY99.

One of the challenges of implementing the CTT was overcoming the institutional practices of both government and contractor engineers. The government and contractor test communities have typically conducted separate flight tests on the UH-60 and have established flight test techniques and data collection procedures to support qualification.

The CTT's challenge was to review the test techniques, data collection requirements, and aircraft configurations required by both test communities to find ways of combining tests to minimize the time required to complete the flight test. The CTT eliminated many of the cost and schedule implications of redundant flight testing typically required by the contractor and government test organizations prior to qualification. Furthermore, the flight test was conducted under a contractor flight release (CFR) approved by the AMCOM Aviation Engineering Directorate, whose engineers were directly involved in developing the flight test plan. This integrated approval process made information required for the CFR readily available and minimized the time required for CFR approval.

Conclusion

In the current environment of shrinking Defense acquisition dollars and fewer technical personnel to accomplish aviation testing and evaluation, innovative test strategies are a requirement, not a luxury. Emphasis has been placed on decreasing procurement times, increasing performance, and reducing test and evaluation costs at all levels of the Army acquisition process. The CTT approach with joint contractor-government testing represents the evolution of testing methodology and has benefited both the government and industry. The WCB is an example of the successful application of the CTT concept in developmental testing.

For the CTT concept to work, chosen personnel must provide a balance of experience, expertise, and training. A CTT's development and continued success depend on trust and confidence. All CTT members must also hold preliminary data in confidence. In early developmental flight testing, the contractor must have an opportunity to adjust to the design without fear of scrutiny. This ensures that no invalid or inaccurate information passes through government channels to decisionmakers. Aircraft modification is a normal step in development, and interim aircraft configurations may not resemble the final fielded configuration. The old adage "The only thing you have is your reputation" is sound advice in the CTT.

While the CTT concept can be extremely positive and successful in all quantifiable regards, several significant personnel issues must be examined carefully prior to and continually throughout CTT formation. A team must be structured to succeed without violating the contractor's responsibility for the product. A Memorandum of Agreement can be established stipulating the contractor's ultimate responsibility and identifying the team leadership. Another key factor that must be addressed is the establishment of parallel supporting organizations, facilities, and equipment. In the future, the CTT concept will be the cost-effective way to conduct tests and evaluations and will become even more essential to materiel development within the U.S. military.

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